



# **TC-2 Multi-rate timecode reader and generator**

## **user manual**

# User Manual Versions

Versions	Changes	Date
1.00	Original Version	01/07/2011

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# **I System Overview**

This processing card will read VITC, LTC and ATC timecode types and overlay this onto an SD or HD video SDI stream. The system will also generate VITC and ATC timecode types enabling timecode format conversation.

## **I.1 The TC-2 product.**

### **I.1.1 Readers**

This processing card contains a VITC reader (SD 525/625 line standards), a LTC reader and three ATC readers (SD or HD line standards). Two of the ATC readers are set to a fixed DBB1 resolution, LTC (DBB1=0) and VITC1 (DBB1=1). The third reader can be set up to resolve any of the other 254 values of DBB1 but defaults to VITC2 (DBB1=2). An LTC reader is included which will read timecodes in the range of +10 x speed and as low as 1/5 x speed. In SD modes a VITC reader is included.

### **I.1.2 Generators**

The unit can display up to three of the read timecodes simultaneously selected by the user. The display is an on-screen display which inserts the characters into the SDI video stream. The character displays can be individually scaled and positioned as well as coloured.

### **I.1.3 Transcoding one format to another**

As well as displaying the timecode on-screen, this unit can also transcode the timecode from one format to another. For example conversion of LTC to VITC or conversation of VITC to ATC. There is also a useful variable 0-9 frame delay/advance which can be used to offset one timecode relative to another to allow for processing delays.

## **I.2 Feature bullet points.**

### **I.2.1 Readers**

- VITC reader, 525/625, selectable lines, 0-9 frame delay advance.
- LTC reader, 0.2 to 10 times speed reading. 0-9 frame delay advance.
- ATC (DBB1=LTC) reader SD/HD standards. 0-9 frame delay advance.
- ATC (DBB1=VITC) reader SD/HD standards. 0-9 frame delay advance.
- ATC (DBB1=user select) reader SD/HD standards. 0-9 frame delay advance.



## I.2.2 Generators

- VITC generator, 525/625, selectable lines, jam to any reader
- ATC (DBB1-LTC) generator, selectable line, jam to any reader
- ATC (DBB1-VITC1) generator, selectable line, jam to any reader
- ATC (DBB1-User) generator, selectable line and DBB1, jam to any reader

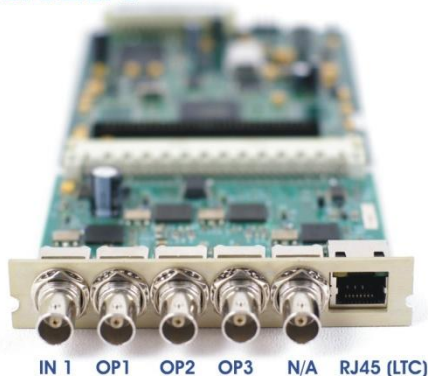
## I.2.3 Display

- 3 on-screen displays with HH:MM:SS:FF and type suffix (eg 12:23:54:02 ATC-L)
- On screen Drop Frame and VITC field markers.
- Colour, size and position of each of the three displays are individually settable.
- Display of time in Hours, Minutes, seconds also on the FP-9 control panel.
- Display of User bits and Flags also on the FP-9 control panel.

## I.2.4 Transcoding/other

- Transcoding from any reader to any generator with 0-9 frame delay/advance.
- Auto priority lock system using three readers in selectable priority order.
- ATC blanker.

### Hardware



### Schematic

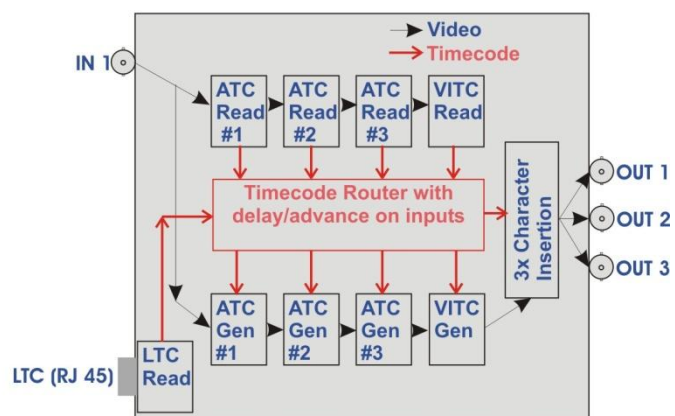


Figure 1-1 TC-2 processing card and simplified block diagram.

## I.3 Associated Equipment for the TC-2

The TC2 processing card requires the following in order to set up and operate the unit.

1. An etherbox chassis (FB-9E). Up to six TC-2 units can be installed in one chassis.
2. A Flexipanel control surface such as an FP-9 or an FP-10 or a java soft control panel license enabling the TC-2 to be run on a web based java application.



Figure 1-2 - Front view of etherbox (FB-9E) fitted with FF-9 blank panel



Figure 1-3 Rear view of etherbox with a single TC-2 installed.



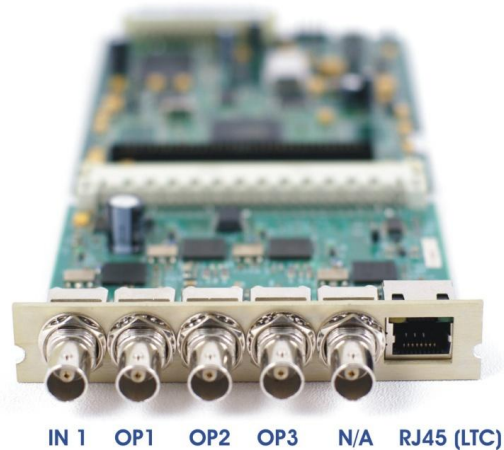
Figure 1-4 FP-9 Flexipanel can be fitted on the FB-9E or remotely using and RR-9 kit.



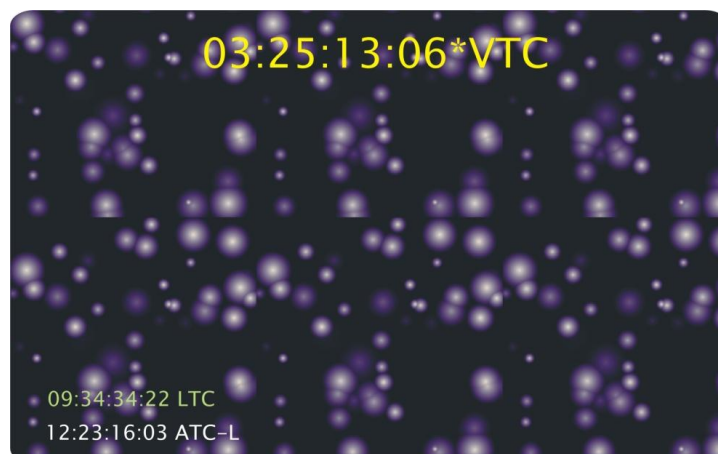
## 2 Installation.

The TC-2 has one digital video SD/HD SDI input. This input may have VITC and/or ATC time code present which can be read by the unit. The unit has three outputs. Any output of the unit is the same as the input but modified dependent on the unit settings. The modifications are in two forms:

1. The output picture can have up to three timecode character inserters each of which consists of up to 17 characters. For example 17:23:34:09 ATC-1.
2. The output may also have new ATC packets and VITC lines from the internal generators.



**Figure 2-1 TC-2 Connections.**



**Figure 2-2 Typical output showing character inserters.**

The unit also has an LTC input via the RJ-45 connector. This is electronically balanced. The table below shows the connections.

1	Not Used	White/Orange
2	Not Used	Orange
3	Not Used	White/Green
4	GND	Blue
5	Not Used	White/Blue
6	Not Used	Green
7	LTC-	White/Brown
8	LTC+	Brown

**Table 1 - LTC pin-out on RJ-45.**

The user should refer to the etherbox user manual for installation of the **TC-2** into a chassis and connection of flexipanel. This will also describe the process of acquiring a processing card (in this case the **TC-2**) by the Flexipanel which is necessary to access the menu structure within the **TC-2**.

## 3 Operation.

This section describes how to use the unit focussing on particular applications.

It is important to first understand the power-on memory system for this device. See the section [Power on memory](#). The reason that this is important is because once you have set up the unit it will not remember the settings that you set unless you save the settings in the power-on memory. Each line standard type 525,625,1080 and 720 have separate power-on memories.

### 3.1 Displaying on-screen timecode

One of the main uses for this unit is to display timecode burnt into the input picture as shown in [Figure 2-2 Typical output showing character inserters](#).

Upon power-on the unit is factory programmed to display three sets of timecode in the lower portion of the screen as shown below.



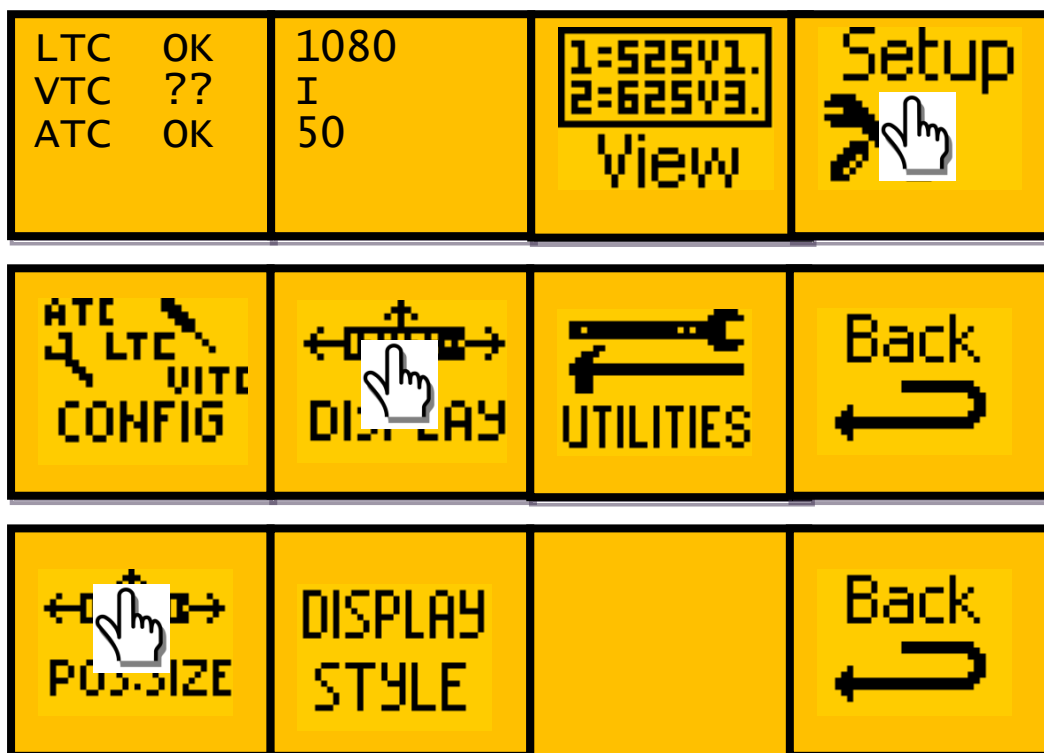
**Figure 3-1 typical start up screen layout.**

The exact size will vary with the line standard. Generally the bigger the canvas (e.g. 1080 is bigger than 625 lines) then the smaller the text can be.

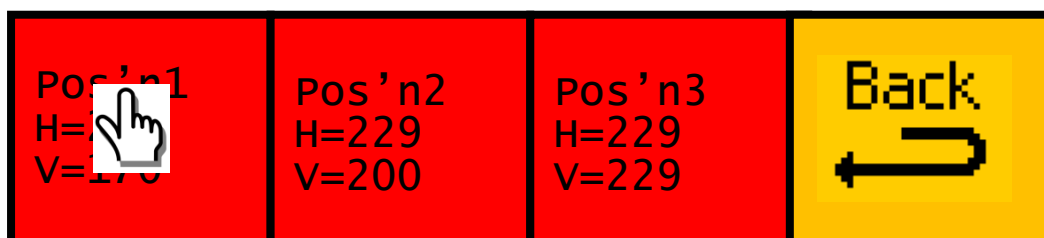
Each of these reader displays are independent of each other and can be positioned, coloured and driven from different timecode readers, as well as removed completely from the screen.

#### 3.1.1 Positioning the displays

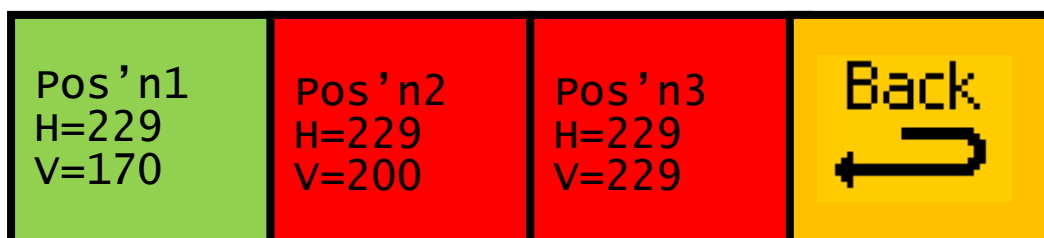
From the top menu press SETUP→DISPLAY→POS:SIZ



This takes you to the three position menus representing the three displays



Pressing the left hand button will cause the menu to change to green and two green LED's will flash above rotary controls A and B. These rotary controls will adjust the H and V ( (H)orizontal and (V)ertical ) position of the display. This can be done for all three displays

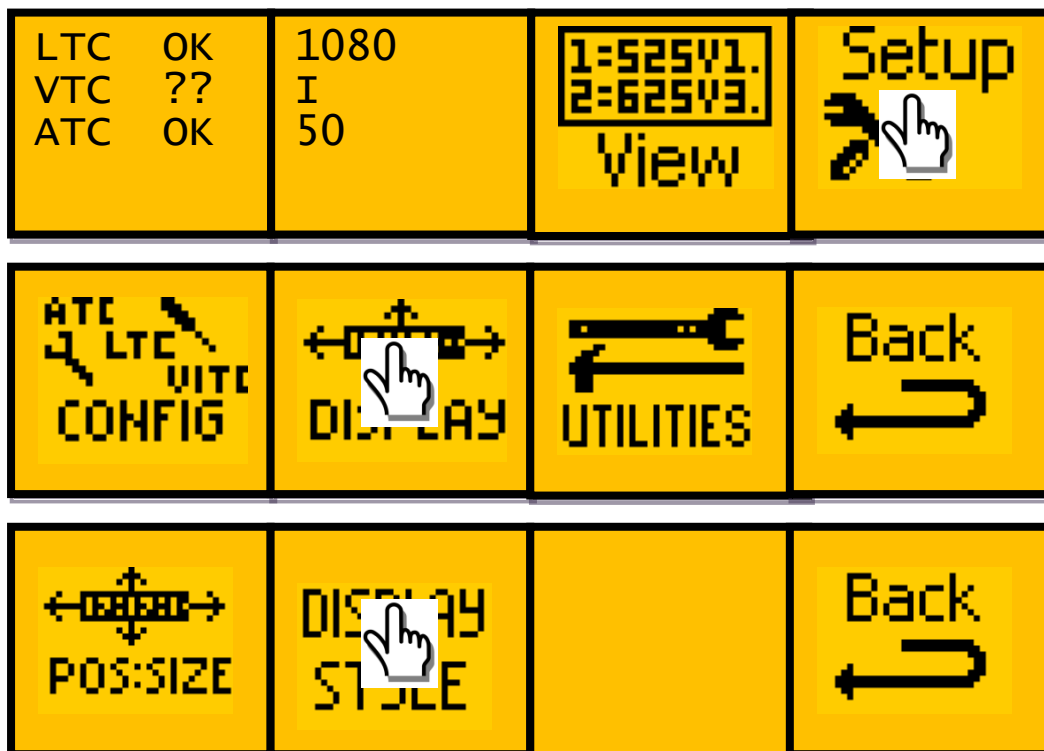


### 3.1.2 Returning to the top menu level.

At any time you can return to the top menu level by pressing the DEVICE SELECT button associated with the TC-2 or by pressing the BACK buttons repeatedly. See [Menu Control of the TC-2](#) for a generic description of using any Eyeheight product with a flexipanel.

### 3.1.3 Changing the display style and reader.

Any display can be coloured, change size and also represent a different internal timecode reader. Press SETUP→DISPLAY→DISPLAY STYLE→



This takes you to the three position menus representing the three displays



Pressing the left hand button will cause the menu to change to green and three green LED's will flash above rotary controls A, B and C. These rotary controls will adjust the reader type, colour and size of the display. The colour adjustment

allows for a background strap to make the timecode visible at all times independent of picture content.



### 3.1.3.1 Switching the displays off.

One of the options in the Reader type menu is NONE. This switches off the display completely.

### 3.1.4 Display special characters. (\* & ; Field Flag, Drop Frame)

There are two specialised characters within the display that are designed to show two of the flags. These are the Drop Frame flag and the Field Flag. If the timecode has the drop frame bit set then the colon between the seconds and the frames will change to a semicolon. For example, **12:43:56;09**. If in VITC mode the field flag is represented by a star "\*" after the numbers, for example, **12:43:56:09\***.

## 3.2 Finding the User Bits and Flags

The timecode specification SMPTE 12M specifies that the data bits that are not used to represent the time can be used also. The User bits are 8 binary groups of four bits each. These bits are called Binary Group 1 to Binary Group 8, often represented as BG1 to BG8. These bits can be assigned by the user and have no generic meaning. The TC-2 can read these bits.

As well as these bits there are also flags which are interleaved within the actual time format in unused bits. These flags are used to give further information about the timecode and are context dependent. There are six flags which can be read by the TC-2.

### 3.2.1 User Bits

The TC-2 will display BG1 to BG8 as eight Hexadecimal (Hex) digits. A hexadecimal digit table is shown below.

Hex	Decimal	Binary
0	0	0000

1	1	0001
2	2	0010
3	3	0011
4	4	0100
5	5	0101
6	6	0110
7	7	0111
8	8	1000
9	9	1001
A	10	1010
B	11	1011
C	12	1100
D	13	1101
E	14	1110
F	15	1111

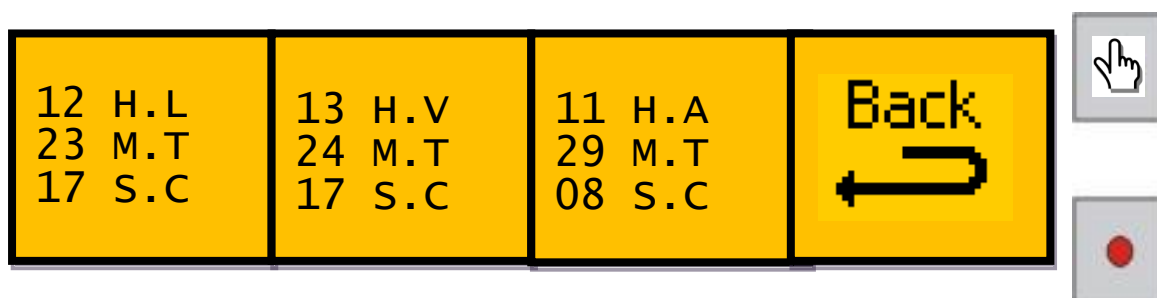
**Table 2 Hexadecimal-Decimal-Binary conversions.**

To view the User Bits and also the flags from the top menu press VEIW TC.




At this point we see the timecode display in HH:MM:SS for LTC, VTC and the selected ATC reader.

Now press the flashing NEXT button.



This will show a display like the following.



64D2 L 7643 U 0002 B	A4D1 V 9043 U 0005 B	6992 A 7003 U 0062 B	Back 
----------------------------	----------------------------	----------------------------	---

This shows the user bits for LTC, VITC and one of the three selectable ATC readers. (LUB, VUB and AUB respectively). The user bits are represented as the first two lines of each display from BG1 to BG8. For example the first display shows the eight hex digits 64D27643, BG1=6, BG8=3.

### 3.2.2 Flags

The flags are also shown as hex digits on the bottom line. There are only 6 flags so these are only ever represented as hex number 0000 to 003F, which is binary 000000 to 111111. The meaning and representations of the flags with reference to SMPTE 12M is:

SMPTE LTC	TC-2	LTC/25	LTC/30	VITC 25	VITC 30
<b>SMPTE VITC</b>					
Bit 10 / <b>14</b>	01	X	DF	X	DF
Bit 11 / <b>15</b>	02	CF	CF	CF	CF
Bit 27 / <b>35</b>	04	BGF0	PC	BGF0	FF
Bit 43 / <b>55</b>	08	BGF2	BGF0	BGF2	BGF0
Bit 58 / <b>74</b>	10	BGF1	BGF1	BGF1	BGF1
Bit 59 / <b>75</b>	20	PC	BGF2	FF	BGF2

**Table 3 - Meaning of timecode flags**

CF=Colour Frame, DF=Drop Frame, PC=Polarity Correction, FF=Field Flag  
BGF=Binary Group Flag, X= not used.

For example if looking at LTC/25 timecode and the TC-2 reads 0025, this would mean Polarity Correction, BGF0 and X are set in the LTC/25 column above.

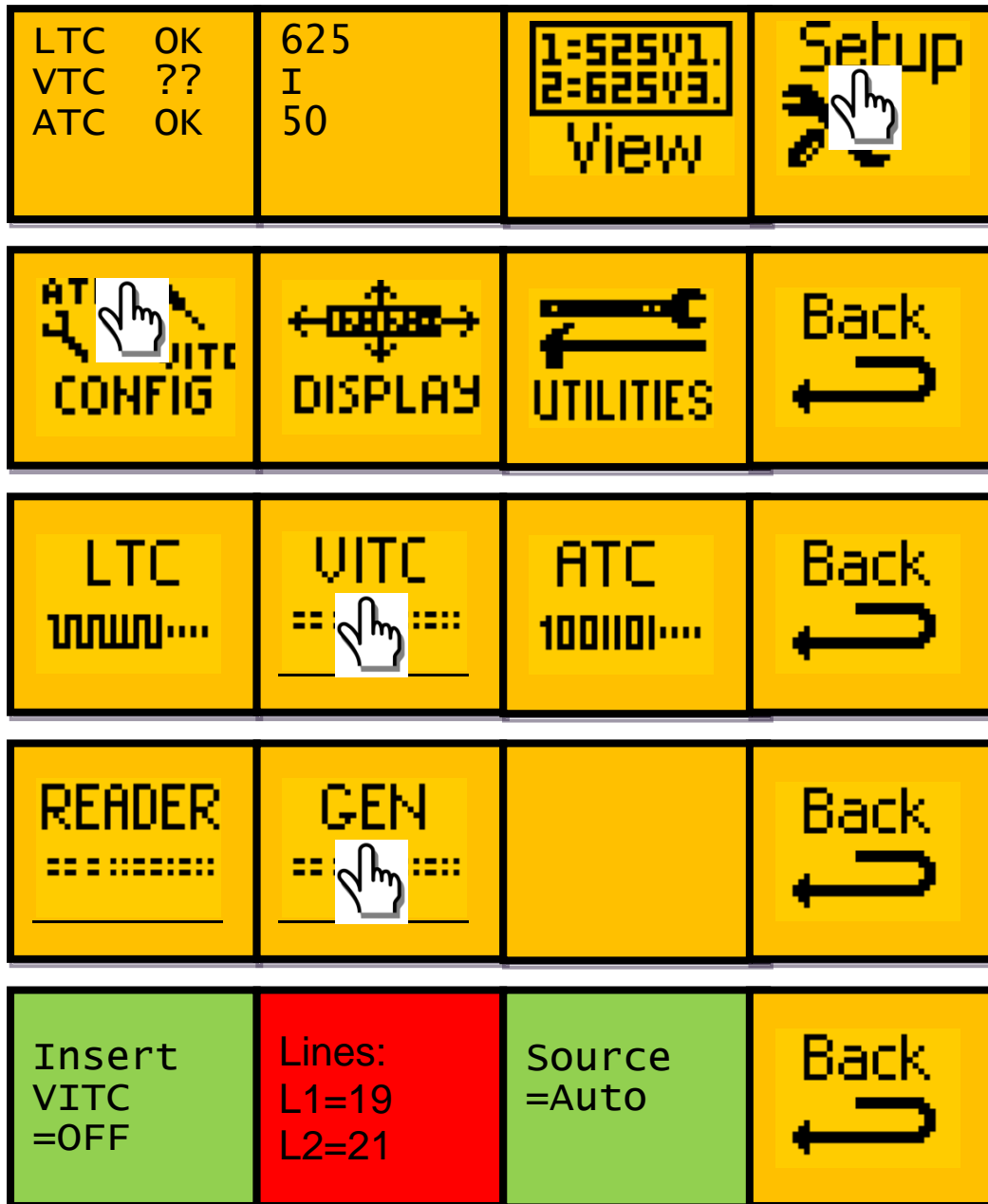
## 3.3 Timecode generators

The TC-2 contains a VITC generator and three ATC generators. These can be locked to any of the five timecode readers. The following is an example of how to

generate VITC locked to an incoming LTC source. Any combination of reader as a locking source and generator can be used.

### 3.3.1 Example of generating VITC locked to LTC.

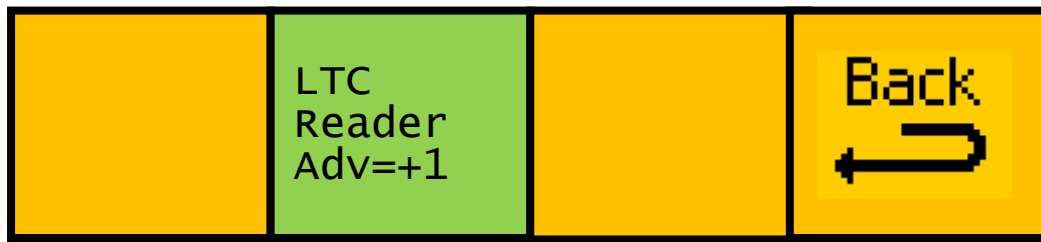
To generate VITC you need to set the system up as follows. From the top menu press: Setup→ATC/LTC/VITC Config→VITC→Gen



Now press the first (Insert VITC) button until it says VITC =ON. Select the video lines that you require on the second button. On the third button (Source) press until the source, which is the locking source, says =LTC. This is now set up to generate VITC locked to the incoming LTC. ( For a generic description of how to operate the menu system see [Flexipanel controls](#).

### 3.3.2 Introducing a timecode offset into the generator.

Each timecode reader has an Advance/delay parameter allowing the read timecode to be offset by up to +/- 9 frames. This means that any generator locked to an input can also be offset by the same amount. Using the above example to introduce an offset you would need to change the time coming from the LTC reader. To do this from the top menu press: Setup→ ATC/LTC/VITC Config→LTC. You will then see the following:



Using the parameter in the second window (use rotary control B) you can adjust the reader delay which will in turn change the generator by the same amount.

## 4 Menu Control of the TC-2

All GeNETics products are controlled using a generic menu system. This generic menu system is operated from a generic panel (Flexipanel FP-9 or FP-10). An FP-9 is shown below (An FP-10 has the same controls in a different layout style). For information about acquiring processor cards for control on a Flexipanel see the etherbox manual section 4.

### 4.1 Flexipanel controls.

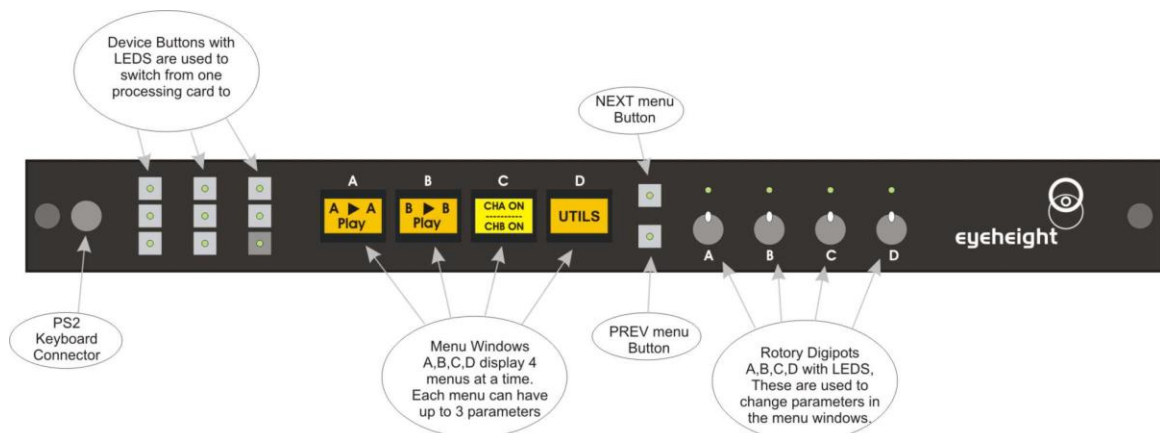


Figure 4-1 Flexipanel (FP-9) controls.

#### 4.1.1 Device Buttons.

There are 8 grey device buttons. These switch between the currently selected processing cards installed in the etherbox. It is also possible to select cards in another chassis if the I-Bus is connected to the other chassis.

#### 4.1.2 Menu Navigation.

There are two ways to navigate from menu to menu.

1. Using the NEXT and PREV buttons. These are for “Flat” menu structures. The NEXT and PREV LEDs will flash while further menus are available.
2. Using a **GOTO ANOTHER MENU** LCD button (as below coloured orange). This is more common and will take you straight to a relevant set of menus. Examples are the **Play** and **UTILS** menu’s shown on Figure 8.



Figure 4-2 Types of menus showing their characteristic colours

### **4.1.3 Parameter adjustment of a green menu.**

A green menu is one in which there is only one adjustable parameter. There are two ways to adjust the parameter in a green menu.

1. Press the green LCD button. This will increment the value in that window. This is most frequently done when the menu parameter is Textural for example switching a parameter between ON and OFF. In this case a button press is most natural.
2. Use the Rotary digipot (A,B,C or D) to adjust the parameter in the respective LCD window (A,B,C or D). The direction and speed of rotation enable numeric values to be set easily.

### **4.1.4 Parameter adjustment of a red menu**

A red menu is one in which there is two or three adjustable parameters. In this case it is necessary to first select the menu by pressing the red button. When the red button is pressed it will turn green and either two or three of the rotary digipot LEDS will flash indicating that the respective rotary digipot will operate the respective parameter.

### **4.1.5 Information display**

A Yellow menu (Which on most panels does look a light orange!) is one in which only information is displayed. An example of this is the software version display.

## **4.2 Memories**

### **4.2.1 Power on memory**

This product has four power-on memories associated with the four line standard types which are 625, 525, 1080 and 720. These are selected implicitly by the input signals line standard. These power-on memories are selected (recalled) every time the unit changes line standard and on power-on whereby the power-on memory is chosen from the input line standard at power-on. These memories will have default values but if you require the unit to start-up each time in a particular mode it will be necessary to set the unit up manually while the appropriate line standard is input. Then you will need to select the menu SETUP→UTILITIES→Reset/Upgrade→RESETS→Set As Pow On Memory. This will then store the users configuration as the power-on memory for the particular input line standard.

### **4.2.2 User Memories**

This product has four sets of user memories associated with the four line standard types which are 625, 525, 1080 and 720. Each set consists of six memories. The set is selected implicitly by the input signals line standard. These user memories are selected and set up by the user. To save a memory setting These memories will have default values but if you require the unit to start-up it is

necessary to set the unit up manually while the appropriate line standard is input. Then you will need to select the menu SETUP→UTILITIES→ MEMS. You then need to use the NEXT and PREV buttons (grey) to find the 6 recall and 6 save memory activation buttons. Select a number to save a user configuration. Selection of a memory is done by pressing the appropriate Memory recall location. The memory locations are named from 1 to 24.

Mems 1-6 are for 625

Mems 7-12 are for 525

Mems 13-18 are for 1080

Mems 19-24 are for 720

### **4.2.3 Naming User Memories**

The user memories can be named with up to 6 characters. To do this plug in a PS-2 Keyboard into a Flexipanel and select the appropriate processor card with a device button. To name memory 1, "TXroom"

1. Hit F9 function key. The LCD displays will change to text entry mode
2. Type "M01:TXroom" and then press enter.
3. You may get a "not acknowledged" message, this does not matter.

Other memories can be named in the same way but changing the 01 to another memory number.

## **4.3 Tamper Locking the TC-2.**

The user can lock specific menus or all the menus on the TC-2 so that it cannot be adjusted with a manual control panel.

To do this plug in a PS-2 Keyboard into a Flexipanel and select the appropriate processor card with a device button. To lock only menu 5. (Next Logo for channel A)

1. Hit F9 function key. The LCD displays will change to text entry mode
2. Type "L05:" and then press enter.

The menu will no longer be adjustable. To unlock menu 5, type "A05:" as step 2 above. Other menus are done in the same way

To lock the whole product type "L:" as step 2 above and to unlock the whole product type "A:" as step 2 above.

## 4.4 The TC-2 Menu Set.

The following set of menus defines the operational controls of the TC-2.

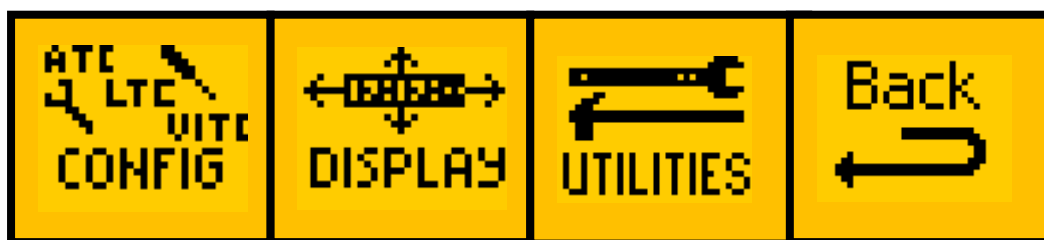
Note: Only parameters with **RED** menu numbers are stored in the memories and the Power-ON memory.

### Menus 00-03 Top Level Menus



Menu Num.	Heading	Function
0	Time Code Validity	This will indicate the validity of the three styles of time code (OK or ??). ATC will be valid if there are any valid ATC packets in the SDI stream.
1	Line Standard	This indicates the line standard in the format <number of lines>, <I or P> indicating (I)nterlaced or (P)rogressive and <Scan Rate> in scans per second.
2	View Time code	Pressing this sends you to menu 36 which displays the current time of three of the time code readers. You can also view the user bits and flags here.
3	Set up	Setup takes you to the main reader and generator setup parameters, The Reader Display parameters and other Utilities.

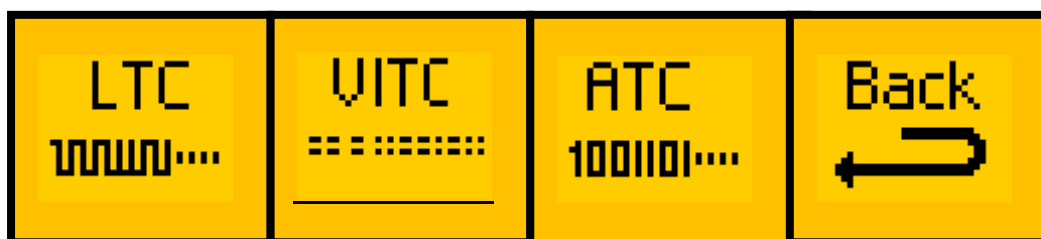
### Menus 04-07 Overall setup





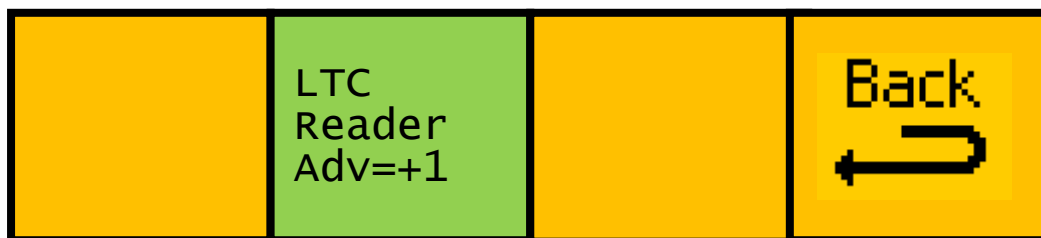
Menu Num.	Heading	Function
4	Time code configuration	This will take you to the overall time code reader and generator setup options. (Menu 8)
5	Display	This takes you to the time code reader display options (Menu 44)
6	Utilities	This takes you to the Memory and reset and upgrade options.(Menu 56)
7	Back	This takes you back a menu level to menu 0

### Menus 08-11 Reader Generator Set-up.



Menu Num.	Heading	Function
8	LTC configuration	This will take you to the LTC reader and generator options. (Menu 12).
9	VITC configuration	This will take you to the LTC reader and generator options. (Menu 16).
10	ATC configuration	This will take you to the LTC reader and generator options. (Menu 28).
11	Back	This takes you back a menu level to menu 4

### Menus 12-15 LTC Reader Set-up



Menu Num.	Heading	Function
12	Not used	This will take you to the LTC reader and generator options. (Menu 12).
13	LTC Reader advance/delay	This parameter adjusts the number of frames adjustment to the reader.

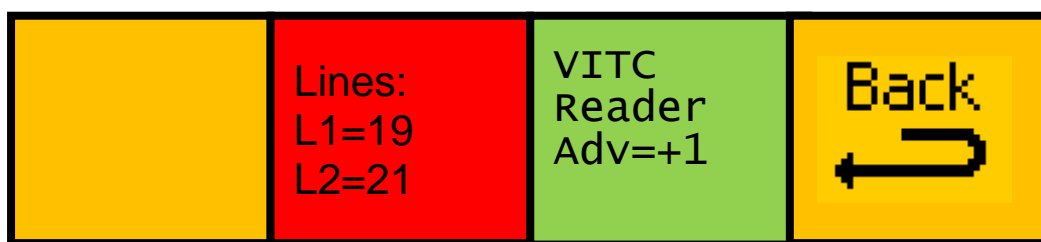
		The reader can be advanced (+) or delayed (-) by up to 9 frames. (Delay is a negative advance).
14	Not Used	
15	Back	This takes you back a menu level to menu 8

#### Menus 16-19 VITC reader/generator parameters select



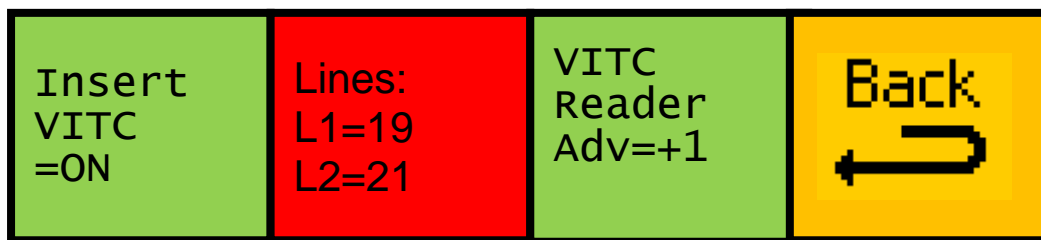
Menu Num.	Heading	Function
16	VITC Reader	This will take you to the VITC reader and generator options. (Menu 20).
17	VITC Generator	This will take you to the VITC reader and generator options. (Menu 24).
18	Not Used	
19	Back	This takes you back a menu level to menu 8

#### Menus 20-23 VITC Reader Set-up



Menu Num.	Heading	Function
20	Not used	
21	VITC read lines	These are the two video line number which are read for VITC.
22	VITC reader advance/delay	This parameter adjusts the number of frames adjustment to the reader. The reader can be advanced (+) or delayed (-) by up to 9 frames. (Delay is a negative advance).
23	Back	This takes you back a menu level to menu 8

### Menus 24-27 VITC Generator Set-up



Menu Num.	Heading	Function
24	Insert VITC	This parameter determines the main state of the VITC generator. This can be ON, OFF or Free Run. In Free Run the system is just counting frames. It is not locked to a "jamming" source.
25	VITC generator lines	These are the two video line numbers on which the VITC are generated.
26	VITC jam source	This selects the source of timecode from which the generated VITC is "jam sync'ed". This can be LTC, VITC, ATC-L, ATC-V1 or ATC-U and AUTO (AUTO is "Auto priority" where up to the time code sources can be selected in priority failure order).
27	Back	This takes you back a menu level to menu 16


### Menus 28-31 ATC reader/generator parameters select



Menu Num.	Heading	Function
28	ATC Reader	This will take you to the ATC reader and generator options. (Menu 32).
29	ATC Generator	This will take you to the ATC reader and generator options. (Menu 68).
30	ATC Set-Up	This takes you to the Auto Priority selection and LCD View selection. (Menu 128).
31	Back	This takes you back a menu level to


		menu 8
--	--	--------

### Menus 32-35 ATC reader type select

ATC-L Reader	ATC-V1 Reader	ATC-U Reader	Back 
-----------------	------------------	-----------------	---


Menu Num.	Heading	Function
28	ATC-L Reader	This will take you to the ATC-L reader options. (Menu 72)
29	ATC -V! Reader	This will take you to the ATC-L reader options. (Menu 76)
30	ATC-U Reader	This will take you to the ATC-L reader options. (Menu 80)
31	Back	This takes you back a menu level to menu 28

### Menus 36-39 View time on LCD.

12 H.L 23 M.T 17 S.C	13 H.V 24 M.T 17 S.C	11 H.A 29 M.T 08 S.C	Back 
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Menu Num.	Heading	Function
36	LTC time	This is the time on the LTC in H.M.S
37	VITC time	This is the time on the VITC in H.M.S
38	ATC time	This is the time on the ATC in H.M.S. The ATC time is selectable between ATC-L, ATC-V1 and ATC-U on menu number 128.
39	Back	This takes you back a menu level to menu 0

### Menus 40-43 View User Bits and Flags on LCD.

64D2 L 7643 T 0002 C	A4D1 L 9043 T 0005 C	6992 L 7003 T 0062 C	Back 
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Menu Num.	Heading	Function
40	LTC user bits and flags	This shows, in hexadecimal the 8 binary groups (BG) starting from BG1 and ending in BG8, represented by the first 8 hex numbers. For example the LTC BG3 is hex "D", or binary 1101. All the groups in ascending order are "64D27643". The next 4 hex dig are a representation of the Flags. The meanings of these flags vary in context (see SMPTE 12M). the LSB of the Hex represents bit 14, then 15, 35, 55, 74 and 75 (only 6 bits relevant). So for example the LTC data "0002" means only bit 15 is set and the others are clear. See main manual for a more detailed explanation.
41	VITC user bits and flags	This is the Binary groups and flags for the VITC. See above (Menu 36) for more explanation.
42	ATC user bits and flags	This is the Binary groups and flags for the ATC. See above (Menu 36) for more explanation.
43	Back	This takes you back a menu level to menu 0

### Menus 44-47 View User Bits and Flags on LCD.

 POS:SIZE	DISPLAY STYLE		Back 
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Menu Num.	Heading	Function
44	Position	This takes you to the on-screen display position parameters for the three displays. (Menu 48)

45	Display and Style	This takes you to the on-screen display size and colour parameters and also to the time code reader display selector. (Menu 52)
46	Not used	
47	Back	This takes you back a menu level to menu 4

#### Menus 48-51 Set display position parameters.

Pos 'n1 H=229 V=170	Pos 'n2 H=229 V=200	Pos 'n3 H=229 V=229	Back 
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Menu Num.	Heading	Function
48	Display 1 vertical and horizontal position	This menu enables adjustment of the vertical and horizontal positioning parameters for display 1
49	Display 2 vertical and horizontal position	This menu enables adjustment of the vertical and horizontal positioning parameters for display 2
50	Display 3 vertical and horizontal position	This menu enables adjustment of the vertical and horizontal positioning parameters for display 3
51	Back	This takes you back a menu level to menu 44

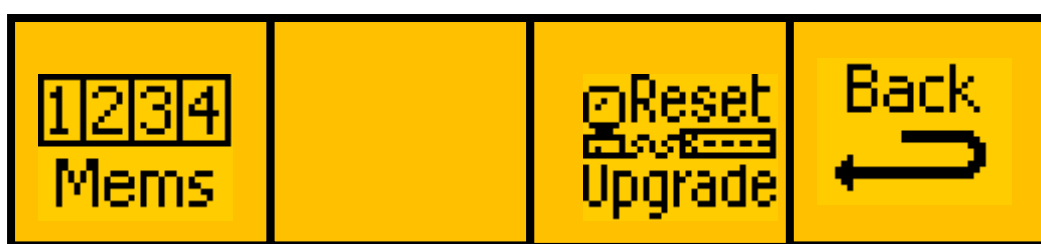
#### Menus 52-55 Set display parameters, size, colour, type.

VITC Col 1 Size 2	LTC Col 1 Size 2	ATC-L Col 1 Size 2	Back 
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Menu Num.	Heading	Function
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52	Set Display 1 parameters	Set the reader type, the colour and size of display 1
53	Set Display 2 parameters	Set the reader type, the colour and size of display 2
54	Set Display 3 parameters and horizontal position	Set the reader type, the colour and size of display 3
55	Back	This takes you back a menu level to menu 44

### Menus 56-59 System Parameters

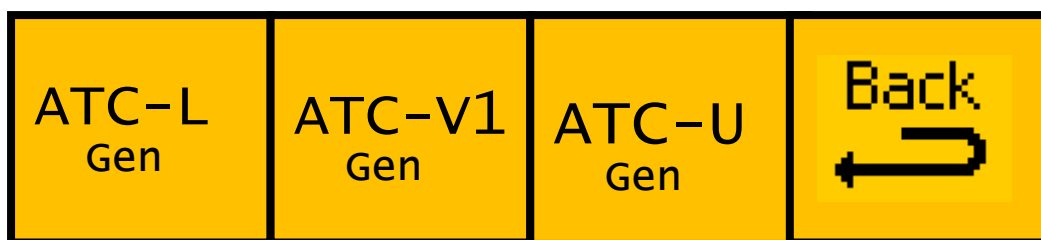


Menu Num.	Heading	Function
56	Memories	This takes you to the six user memories which can be set and recalled. (Menu 96)
57	Not used	
58	Reset/Upgrade	This takes you to Factory Reset / reboot as well as the power-on memory function. (Menu 120)
59	Back	This takes you back a menu level to menu 4

**Menus 60-63, these menus are current blank and for future upgrades**

**Menus 64-67, these menus are current blank and for future upgrades**


### Menus 68-71 ATC generator type select






Menu Num.	Heading	Function
68	ATC –L Generator	This will take you to the ATC –L (DBB1=LTC) generator options. (Menu 84).
69	ATC-V1 Generator	This will take you to the ATC-V1 (DBB1=VITC1) generator options. (Menu 88).
70	ATC-U Generator	This will take you to the ATC-U (DBB1=<User selectable>) generator options. (Menu 92).
71	Back	This takes you back a menu level to menu 28

#### Menus 72-75 ATC-L reader parameters.

ATC-L Reader DLY=+0	DBB2 : =255	DBB1=0 Set for LTC	Back 
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Menu Num.	Heading	Function
72	ATC –L Reader Advance/Delay	This parameter alters the read advance of the ATC-L (LTC) reader. This can be adjusted by up to +/-9 frames. “+” represents and advance and “-“ represents a delay.
73	DBB2 value	This shows the read value of the ATC DBB2 8 bit byte.
74	Information	This is not a variable but reminds you that this reader is permanently set to DBB1=0, which is looking for LTC sourced ATC packets.
75	Back	This takes you back a menu level to menu 32

### Menus 76-79 ATC-V1 reader parameters.

ATC-V1 Reader DLY=+0	DBB2 : =255	DBB1=1 Set for VITC-1	Back 
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Menu Num.	Heading	Function
76	ATC –V1 Reader Advance/Delay	This parameter alters the read advance of the ATC-V1(VITC-1) reader. This can be adjusted by up to +/-9 frames. “+” represents and advance and “–” represents a delay.
77	DBB2 value	This shows the read value of the ATC DBB2 8 bit byte.
78	Information	This is not a variable but reminds you that this reader is permanently set to DBB1=1, which is looking for VITC sourced ATC packets.
79	Back	This takes you back a menu level to menu 32

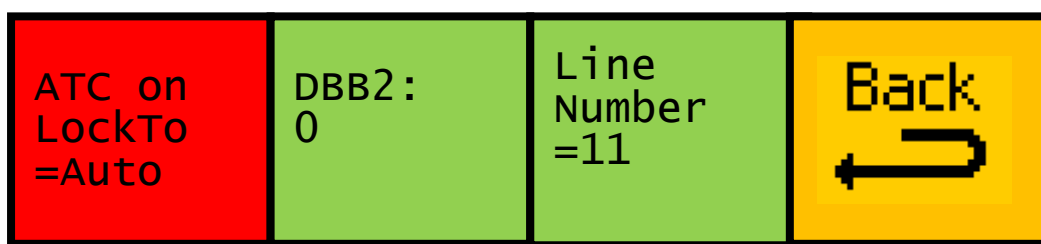
### Menus 80-83 ATC-U reader parameters.

ATC-U Reader DLY=+0	DBB2 : =255	DBB1: =2 VITC-2	Back 
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Menu Num.	Heading	Function
80	ATC –U Reader Advance/Delay	This parameter alters the read advance of the ATC reader. This can be adjusted by up to +/-9 frames. “+” represents and advance and “–” represents a delay. This ATC reader can be selected to read any of the 256 different ATC types. This is set in


		menu 82 (DBB1 value)
81	DBB2 value	This shows the read value of the ATC DBB2 8 bit byte.
82	DBB1 set ATC type.	This sets up the ATC packet type that you are looking for. There are 256 options.
83	Back	This takes you back a menu level to menu 32

#### Menus 84-87 ATC-L generator parameters.




Menu Num.	Heading	Function
84	ATC –L Generator locking reference and status.	This selects the locking reference for the ATC-L generator and also it's status. The Status can be "on", "off" or FrRun (Free running, i.e. not locked). The locking reference can be specifically any of the five internal time code readers. (LTC/VITC/3xATC) or set to "Auto" (Auto Priority – see menu 128) where the unit can lock to one reader and if that fails fall back on two other readers.
85	DBB2 value	This inserts this value for DBB2 ATC. Strictly DBB2 has no relevance in LTC sourced ATC.
86	Insert line number.	This is the video line number onto which the generator inserts the ATC packet.
87	Back	This takes you back a menu level to menu 68

### Menus 88-91 ATC-V1 generator parameters.

ATC on LockTo =Auto	DBB2: L6/8 Dual	Line Number =12	Back 
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Menu Num.	Heading	Function
88	ATC –V1 Generator locking reference and status.	This selects the locking reference for the ATC-V1 generator and also it's status. The Status can be "on", "off" or FrRun (Free running, i.e. not locked). The locking reference can be specifically any of the five internal time code readers. (LTC/VITC/3xATC) or set to "Auto" (Auto Priority – see menu 128) where the unit can lock to one reader and if that fails fall back on two other readers.
89	DBB2 value	This inserts this value for DBB2 ATC. The DBB2 value provides information about the VITC source. The information is the line pair that was used for the VITC and also if it was a single or double VITC line.
90	Insertor line number.	This is the video line number onto which the generator inserts the ATC packet.
91	Back	This takes you back a menu level to menu 68

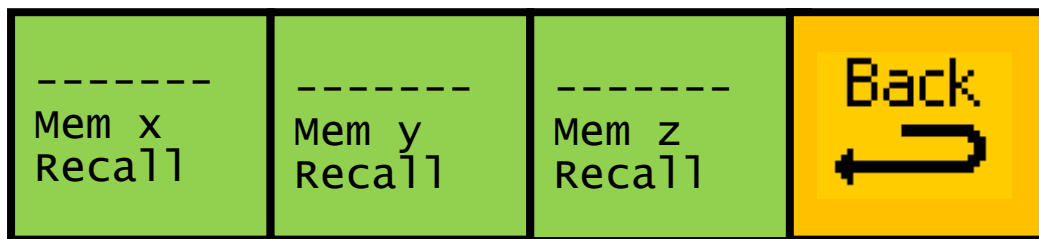
### Menus 92-95 User selected ATC generator parameters.

ATC on LockTo =Auto	D2=40 Line= 14	DBB1: =2 VITC-2	Back 
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Menu Num.	Heading	Function
92	User ATC Generator	This selects the locking reference for the user selectable ATC generator and

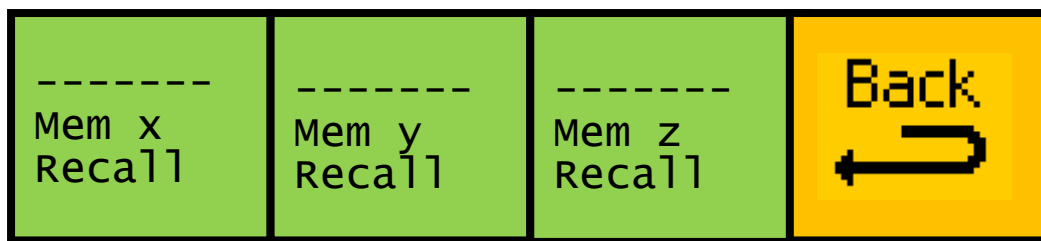
	locking reference and status.	also it's status. The Status can be "on", "off" or FrRun (Free running, i.e. not locked). The locking reference can be specifically any of the five internal time code readers. (LTC/VITC/3xATC) or set to "Auto" (Auto Priority – see menu 128) where the unit can lock to one reader and if that fails fall back on two other readers.
93	DBB2 value and line number	This inserts this value for DBB2 ATC. The DBB2. This also sets the video line number onto which the generator inserts the ATC packet.
94	DBB1 ATC type	This sets the ATC packet type. As the value is varied there is an indication of the meaning of the selected ATC type on the lower line.
95	Back	This takes you back a menu level to menu 68

#### Menus 96-99 User Memories.



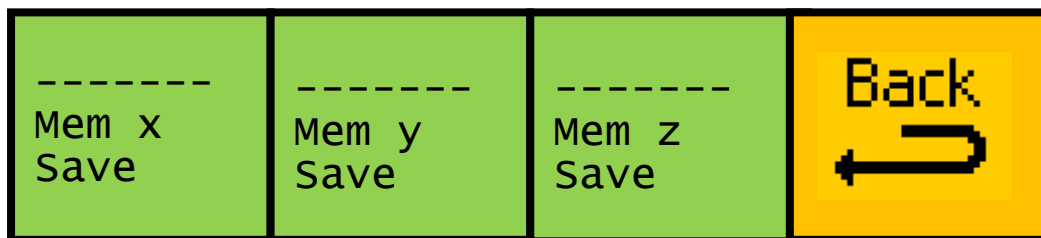
Menu Num.	Heading	Function
96	Memory Recall	This recalls the labelled memory. x, y and z depend on the line standard. See <a href="#">User Memories</a> .
97	Memory Recall	This recalls the labelled memory. x, y and z depend on the line standard. See <a href="#">User Memories</a>
98	Memory Recall	This recalls the labelled memory. x, y and z depend on the line standard. See <a href="#">User Memories</a>
99	Back	This takes you back a menu level to menu 4

### Menus 100-103 User Memories.



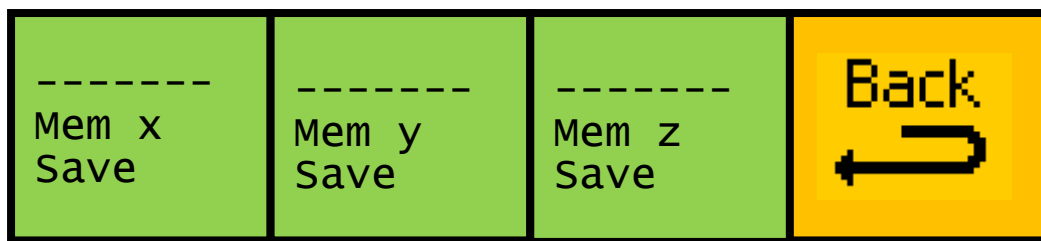
Menu Num.	Heading	Function
100	Memory Recall	This recalls the labelled memory. x, y and z depend on the line standard. See <a href="#">User Memories</a> .
101	Memory Recall	This recalls the labelled memory. x, y and z depend on the line standard. See <a href="#">User Memories</a>
102	Memory Recall	This recalls the labelled memory. x, y and z depend on the line standard. See <a href="#">User Memories</a>
103	Back	This takes you back a menu level to menu 4

### Menus 104-107 User Memories.



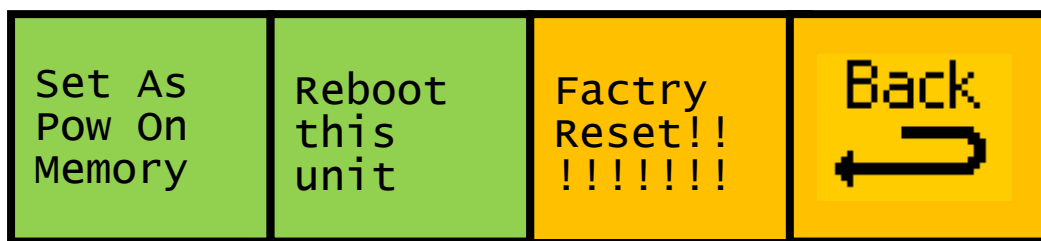
Menu Num.	Heading	Function
104	Memory Save	This saves the current setting into the labelled memory. x, y and z depend on the line standard. See <a href="#">User Memories</a> .
105	Memory Save	This saves the current setting into the labelled memory. x, y and z depend on the line standard. See <a href="#">User Memories</a> .
106	Memory Save	This saves the current setting into the labelled memory. x, y and z depend on the line standard. See <a href="#">User Memories</a> .
107	Back	This takes you back a menu level to menu 4

### Menus 108-111 User Memories.



Menu Num.	Heading	Function
108	Memory Save	This saves the current setting into the labelled memory. x, y and z depend on the line standard. See <a href="#">User Memories</a> .
109	Memory Save	This saves the current setting into the labelled memory. x, y and z depend on the line standard. See <a href="#">User Memories</a> .
110	Memory Save	This saves the current setting into the labelled memory. x, y and z depend on the line standard. See <a href="#">User Memories</a> .
111	Back	This takes you back a menu level to menu 4

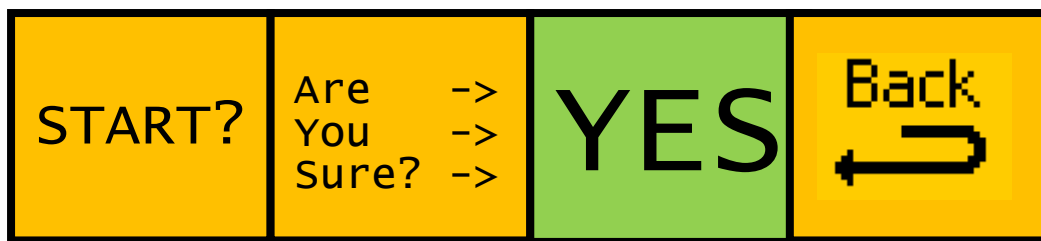
### Menus 112-115 Resets and power-on memory



Menu Num.	Heading	Function
112	Set as Power-on Memory	Pressing this sets up the current parameters as the power-on settings and line standard change settings for this unit in the current line standard. See <a href="#">Power on memory</a>
113	Reboot this unit	This causes a soft restart of the unit. No memory parameters are lost.
114	Factory Reset	This takes you to the factory reset option.(Menu 116)
115	Back	This takes you back a menu level to menu 120



**Menus 116-119 Factory reset last chance to back out.**



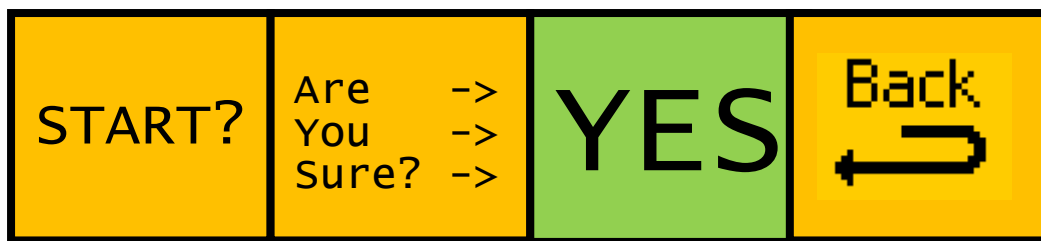
Menu Num.	Heading	Function
116	START?	Just information. Ask if you are sure you want to start a factory reset.
117	Are you sure?	
118	Factory Reset	This WILL start a factory reset. This will lose all of your stored settings and will take several minutes to restart the unit.
119	Back	This takes you back a menu level to menu 120

**Menus 120-123 Reset and upgrade software.**



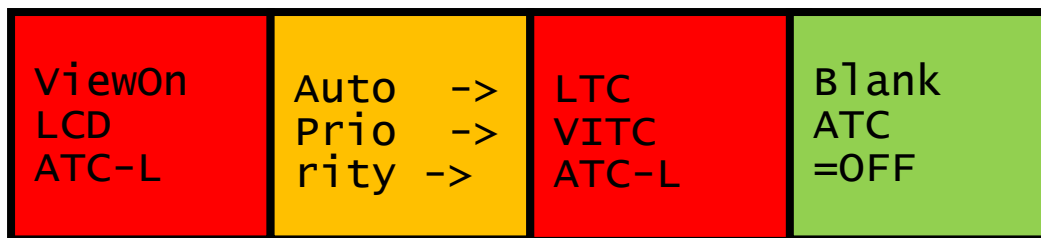
Menu Num.	Heading	Function
120	Upgrade to new software.	This takes you to the menus for starting a software update. (Menu 124)
121	Not Used	
122	RESETS	This takes you to the reset and power-on memory options. (Menu 112)
123	Back	This takes you back a menu level to menu 56

### Menus 124-127 Upgrade software last chance to back out.



Menu Num.	Heading	Function
124	START?	Just information. Ask if you are sure you want to start a software upgrade. If hit by accident the unit will recover if you leave it a minute or two.
125	Are you sure?	
126	Upgrade Software?	This will put the system in a mode where it is waiting for a software upgrade. If no software upgrade is provided then the system will exit this menu harmlessly in a few minutes.
127	Back	This takes you back a menu level to menu 120

### Menus 128-131 Utilities, auto priority, LCD view select



Menu Num.	Heading	Function
128	View on LCD	This selects which reader is viewed on the ATC LCD view on the flexipanel (FP-9). This can be ATC-L, ATC-V1 or ATC-U.
129	Info (auto pri...)	
130	Auto priority selection.	Here you select the three choices for auto priority selection. The first choice is on the top (LTC here) if this fails the second choice is used (VITC here). If this fails then the third choice is used

		(ATC-L here). These are the choices when “Auto” is selected as a locking source for any of the time code generators.
131	Blank ATC	This is an option to blank all ATC packets that are input into TC-2 unit. This may be desirable if you are generating ATC.

# 5 Technical Appendix

## 5.1 GPI/Tally/RS232 technical information.

The Processor card has an RJ-45 connector with GPI, Tally and RS232 connections as shown below:

1		White/Orange
2		Orange
3		White/Green
4	GND	Blue
5		White/Blue
6		Green
7	LTC-	White/Brown
8	LTC+	Brown

**Table 4 GPI/Tally and RS232 pin-out on RJ-45.**

## 5.2 Technical Specification.

### Physical

Weight	200g
PCB dimensions	100mm x 225mm
Module extents	250mm x 107mm x 20mm (includes connectors and connector plate)
Humidity	Recommend 40 to 55% Limits 20 to 80%.
Temperature	Recommend less than 35degC ambient around PCB (Internal chassis temperature)
Module Format	Proprietary for eyeheight chassis only.
Suitable Chassis	eyeheight FB-9E for full functionality. (provides extra GPI/Tally/Ethernet/Rs232 or 422) eyeheight FB-9/MX-9 with product dependent functionality (contact eyeheight)
Connectors	Standard 3G BNC connectors for SDI RJ-45 for LTC. 48Way DIN for chassis connection.

### Electrical

Supply Voltage	4.5V - 5.5V, internally regulated on PCB.
Supply Current	Not greater than 1.7Amps.
Power consumption	<10W per card.
Communication	I-Bus (proprietary eyeheight comms system similar to can-bus)
External Indicators	2xLED's. Green flashing for processor running and steady Yellow for Firmware loaded.

SDI input (S3-12)	BT.656/SMPTE 259M 270Mbit and SMPTE 292M 1.485Gbit.
3 x SDI output (S3-12)	BT.656/SMPTE 259M 270Mbit and SMPTE 292M 1.485Gbit.

Formats Supported: TC-2 with "S" code all support 625i (PAL) and 525i (NTSC).  
TC-2 with "M" code all support 625i (PAL) and 525i (NTSC) and HD rates as in the following table:-

	23.97	24	25	29.97	50	59.94	60
720p	✓	✓	✓	✓	✓	✓	✓
1080i					✓	✓	✓
1080p	✓	✓	✓	✓			